



Annual Assessment Report for Academic Programs

The University Assessment Team advocates for the enhancement of student learning through purposeful, meaningful, and feasible student-outcomes assessment practices. The Assessment Team seeks to collaborate with programs, departments, and units to ensure that effective assessment of student learning occurs across the University. To assist in meeting this goal, the Team requests that you complete this Annual Assessment Report form to document student learning in your program. A PDF version of this completed form will be posted to the Academic Affairs Assessment website. Please note that this Annual Assessment Report form should only be completed after you have an Assessment Plan for Academic Programs forms on file with the University Assessment Team. The plan is completed once and only updated when revisions have been made to components of the plan.

1. **Degree Level and Program Name:** MS Vehicle Systems Engineering
2. **College/School:** College of Engineering & Science
3. **Assessment Overview** - Briefly share how student learning outcomes assessment is conducted within your program/department (e.g. number of outcomes, examples of assignments used, and frequency of assessment).

The Master of Science in Vehicle Systems Engineering (VCE) Program has 5 learning outcomes. In this current assessment we have one learning outcome to evaluate (Outcome 5) shown below:

Outcome (5): Design comprehensive cybersecurity solutions for integrated vehicular systems or subsystems that span over multiple attack vectors.

4. **Student Learning Outcomes & Benchmarks** -Which student learning outcome(s) from the assessment plan filed with the University Assessment Team is/are being reported on in this report? Include the corresponding benchmark(s) for each outcome.

Outcome (5): Design comprehensive cybersecurity solutions for integrated vehicular systems or subsystems that span over multiple attack vectors.

Course number and name: VCE 5600-OL3 Capstone Design for Vehicle Cyber Engineering

Term taught: III (Summer) 2024

Number of students completing the course: 3

Instructor name: Rita M. Barrios, Ph.D., Mark Zachos

For the learning outcome formally assessed in this worksheet, complete the following table.

For quantitative assessment methods, a score of 3.5/5 (i.e., 70%) or better is considered as having achieved the program outcome. For rubric-based assessment methods, students achieving a level of 3/4 (i.e., 75%) or better are considered to have performed satisfactorily. Rubrics for determining the level of achievement for this outcome are included in this document.



5. **Institutional Outcomes** - For which institutional outcome(s) do the reported student learning outcome(s) align?

SLO Outcome Alignment	Institutional Outcome
Yes	I. Jesuit & Mercy Values
	II. Diversity & Cultural Awareness
Yes	III. Critical Thinking & Problem Solving
Yes	IV. Communication
Yes	V. Professionalism
	VI. Lifelong Learning

6. **Assessment Period:** Select the academic year for which you are reporting results (i.e. when data were collected):

2024-2025

7. **Program Assessment Results** -Briefly summarize the assessment results and how they relate to benchmark(s).

For the learning outcome formally assessed in this worksheet, complete the following table.

For quantitative assessment methods, a score of 3.5/5 (i.e., 70%) or better is considered as having achieved the program outcome. For rubric-based assessment methods, students achieving a level of 3/4 (i.e., 75%) or better are considered to have performed satisfactorily. Rubrics for determining the level of achievement for this outcome are included in this document.

Assessment method (specific exam problems, homework problems, projects, student surveys, etc.) % of Students achieving this outcome in Direct and Overall (no Indirect)

Threat Model: Labs 1 – 3: Build a threat model based on the provided block diagram of a vehicle Body Control Module (BCM) and 2 ECUs (Door Lock and Radar Sensor); Learn Threat Modeling using the tool Items Secure Direct 100% Overall 100%

Lab1: Access Controls; Build access control polices in the Linux environment to provide access to the various files in the structure.

Direct 100% Overall 100%

Lab2: Reverse Engineering; Explore the differences that arise between the original source code and its disassembly from its binary form using the IDA software to disassemble the C language program. Direct 100% Overall 100%

Lab3: Wireshark and Packets; Introduce the Wireshark network traffic analyzer to capture the traffic and to locate a specific packet.

J1939-91C Direct 100% Overall 100%



Assignments: Analyze a targeted ELD hack and the J1939-91c standard to describe how the main concepts of the standard could have helped improve the commercial vehicle Electronic Logging Device security.
Direct 67% Overall 67%

Woodpecker/Embedded Lab; Build FMEA based on the targeted systems to identify the intersection between safety and security focusing on how security protects the safety of the vehicle. Direct 67% Overall 67%

Research Paper: Generative AI and Vehicle Cybersecurity: How can Generative AI be used to identify vulnerabilities in a vehicle system.
Direct 100% Overall 100%

Student Presentation of Research Direct 100% Overall 100%

Comments:

All assignments are designed as individual assessments to allow the student to think deeply about architecting a security solution to mitigate the identified vulnerability in the system. The course starts with the Threat Assessment and Risk Analysis (TARA) using the industry tool Itemis Secure. The student then progresses through labs to learn how to identify and validate a vulnerability in the vehicle system, and then to architect an appropriate solution.

8. **Planned Actions and/or Actions Taken in Response to Assessment Results** - Briefly summarize how you are using the assessment results to enhance student learning and improve program quality.

Given that this course is a fully online course, developing an experiential learning environment is difficult. We have identified several online environments to support the online learning environment. One of these is Eclipse SDV prototyping platform. We are looking forward to seeing how we might include this in the coursework. Additionally, the students attending this course are very capable. We see that we need to offer more advanced labs to ensure students are learning new skills.

However, the assessment of the students' projects, labs, research, and presentations yielded a range of marks from 75% to 100%, indicating a high level of achievement